HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Big White Salmon Summer Steelhead (Skamania Stock Outplant)
Species or Hatchery Stock	Summer Steelhead-*Oncorhynchus mykiss* Skamania Hatchery Summer Steelhead Stock
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Big White Salmon Subbasin/Columbia Gorge Province
Date Submitted	-
Date Last Updated	January 18, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Big White Salmon River Summer Steelhead Plant

1.2 Species and population (or stock) under propagation, and ESA status.

Summer Steelhead (*Oncorhynchus mykiss)*

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
	Washougal-Skamania Hatcheries Complex Manager
Agency or Tribe:	Washington Department Fish and Wildlife
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Manager of Mitchell Act Funds

Clark Public Utility, through a M.O.U., provides funds and facilities for partial rearing of Skamania Winter Steelhead at Vancouver Hatchery. The Northwestern Lake net pen project in previous years was a joint effort with the White Salmon Steelheaders Club and PacificCorp.

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources
Mitchell Act

Funding for this program is provided through the Mitchell Act via National Marine Fisheries Service (NMFS) and through Clark Public Utility.

Operational Information	Number
Full time equivalent staff	4
Annual operating cost (dollars)	$463,581

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Washougal/Skamania Hatchery Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Skamania Hatchery- North Fork Washougal River
Broodstock collection location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Adult holding location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Spawning location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Incubation location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower
Rearing location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower
Release location (facility name, stream, RKm, subbasin)	Big White Salmon/RKm 2.4/Big White Salmon

1.6 Type of program.

Isolated Harvest

1.7 Purpose (Goal) of program.

To plant up to 20,000 summer steelhead smolts at 5.0 ffp into the Big White Salmon River. The goal of plants made to the Big White Salmon River is to mitigate for activities within the Columbia River basin, which has reduced salmonid populations.

1.8 Justification for the program.

The program will be operated to provide fish for harvest while minimizing adverse affects on listed fish. In past years, plants made to Little White Salmon (discontinued) were dependent on fish available from Skamania Hatchery programs. With plants discontinued to the Little White Salmon, plants will be made to the Big White Salmon River if they are available. There is already a popular fishery at the mouth of the river, with many fish "dip-ins" or strays from other subbasins making up a majority of the catch. Since steelhead and salmon in the White Salmon River basin are listed for protection under the ESA, tributary fisheries must be approved by NOAA-Fisheries. The White Salmon has "wild release" regulations so natural fish are not harvested. The wild release regulations primarily protect natural fish from these other subbasins. Subbasin sport harvest is limited to hatchery steelhead and natural fish must be released.

WDFW developed a Fisheries Monitoring and Evaluation Plan (FMEP) for steelhead and salmon fisheries in the Middle Columbia River ESU in 2001 and is in final consolation with NOAA-Fisheries for a section 4(d) permit for these activities. Although not monitored directly, the mortality of catch and release fisheries for steelhead in the White Salmon River is estimated from hooking mortality studies and fishing effort in other basins within southwest Washington (Rawding 1998). Estimates of wild steelhead harvest in the White Salmon are similar to those in the Kalama Subbasin. It is assumed that sport fishery wild steelhead harvest rates in the White Salmon River are similar to the Kalama River. Wild summer steelhead impacts were substantially reduced in 1986 after wild steelhead release regulations were enacted. Current impacts from

tributary sport fisheries are estimated to be 4% for summer steelhead and 4% for winter steelhead. Mainstem Columbia River sport and commercial impacts are not estimated directly for White Salmon River steelhead but are estimated for the Middle Columbia River ESU, which includes the White Salmon steelhead population. Middle Columbia River impacts are less than *2% and these impacts occur mainly in the spring chinook tangle net fishery and the summer steelhead sport fishery. WDFW receives authorization for these fisheries through a Section 7 consultation/Section 10 Permit and biological opinion from NOAA-Fisheries. Tribal fisheries impact both summer and winter steelhead. These fisheries are authorized through a Section 7 consultation/Section 10 Permit and biological opinion from NOAA-Fisheries. Tribal fisheries target salmon stocks and steelhead are incidentally taken when salmon fishing. Winter steelhead are caught primarily in the winter fishery and the spring chinook fishery. Summer steelhead are caught primarily in the fall fishery, with fewer fish caught in other fisheries. Both winter and summer stocks are intercepted in ceremonial and subsistence fisheries. The annual cumulative impact from all fisheries is likely to range from 11% to a maximum of 16% of run size (White Salmon Subbasin Plan 5/28/2004, Prepared for the Northwest Power and Conservation Council).

To minimize adverse interactions with listed juvenile fish, the project adheres to a number of program guidelines.

- Releases are consistent with WDFW Statewide Steelhead Rearing Guidelines (July 2001) indicating the date, size of fish and condition factor of smolts at release for rapid migration and a high level of smoltification, which reduces residence time in the streams after release.
- Physiological measures, including allowable population standard deviation (STD) and coefficient of variation (CV) on fork length, will be used to indicate when the population has reached the desired physiological status.
- WDFW fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released, further decreasing the likelihood for disease transfer to wild salmon and steelhead.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish (Kalama River steelhead research station).

In order to minimize impact on listed fish by the Big White Salmon River summer steelhead program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Big White Salmon River summer steelhead program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	This is a direct river plant. For these risk aversion measures see Skamania summer Steelhead HGMP.
Intake Screening	4.2	
Effluent Discharge	4.2	
Disease Transmission	7.9, 10.11	*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See HGMP Section 1.10

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Currently a 10-year average of 2,588 adults are harvested in this sub-basin, but contribution of this program cannot be independently identified as many fish are from different programs.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity. Maintain effective population size.	A minimum of 100 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return (Skamania Hatchery).	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (adipose-fin clip) for selective fisheries.	Returning fish are sampled throughout their return for length, sex, mark and
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens and parasites and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (5.0–5.5 fish/lb) and released at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish.	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Broodstock collection is done at Skamania Hatchery. 200 males and 200 females are needed to reach production goals and on-station broodstock needs. Egg take goal is 450,000 (FBD 2004). The steelhead plant to Big White Salmon is a portion of juveniles from those adults. See also Skamania Summer Steelhead HGMP.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Releases into the Big White Salmon River have been sporadic over the past decade and frequently dependent upon available fish from Skamania Hatchery. Plants were made in 1995, 1997 and 1998 of 29,900, 13,800 and 30,600 fish respectively. In past years, mostly winter steelhead plants have been made in the Big White Salmon. Steelhead smolt plants in this Region have been reprioritized so that juvenile allotments that have in the past, gone to Little White Salmon will now be used in the Big White Salmon River. Annual release goal is at least 20,000 fish.

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Fish are released for harvest only and no escapement is intended for this program. Program performance cannot be measured accurately as many catches are believed from upriver programs that stop over (dip-ins) in the mouth of the White Salmon River.

Table 2. Sport catches reported form Big White Salmon River (WDFW Historical Database).

Return Year	Sport Harvest Hatchery
1993/94	1,335
1994/95	2,121
1995/96	2,652
1996/97	2,454
1997/98	1,747
1998/99	1,055
1999/00	1,102
2000/01	2,075
2001/02	8,363
2002/03	2,971
2003/04	Na

1.13 Date program started (years in operation), or is expected to start.

Outplants to the Big White Salmon River started in 1982 (1981-1994 WDFW Historical Database records).

1.14 Expected duration of program.

The steelhead smolt program for selective fisheries in the Big White Salmon River is on-going.

1.15 Watersheds targeted by program.

White Salmon Subbasin/Columbia Gorge Province

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The Skamania Hatchery, non-native summer steelhead program produces smolts for planting in many regional streams. Skamania stock summer steelhead are released into the Big White Salmon River to continue a summer steelhead sport fishery while eliminating a directed harvest on wild summer steelhead. Smolts are released low in the system to avoid competition and predation with natural stocks and to concentrate returning adults in the lower river so that they are highly susceptible to harvest. Any adults that escape the fishery may spawn in the system.

Potential Alternatives to the Current Program

Alternative 1: Eliminate the non-local program and use the native stock for this program. WDFW is currently involved in a research project on the Kalama River that will provide information on the feasibility of using the native population. This alternative would require utilizing the local stock, which could not occur without better knowledge of the condition of the wild stock.

Alternative 2: Eliminate the program. This action would significantly reduce potential interaction with the natural population and eliminate impacts on other ESA listed species. This alternative is not considered acceptable; currently this program supports a very popular sport fishery in the Big White Salmon River.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

None, concurrent with ESA requirements, WDFW is writing HGMP's to cover all programs produced at Washougal Complex including; Columbia River Chum, fall Chinook, coho, summer and winter run steelhead, including outplants to numerous Region 5 streams including the Big White Salmon River.

2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Summer Steelhead-Natural	L	L
Fall Chinook Tule-Natural	L	L
Winter Steelhead-Natural	L	L
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

2.2.1 Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.
None.

Identify the ESA-listed population(s) that may be incidentally affected by the program.

Middle Columbia River Steelhead *(Oncorhynchus mykiss*), are federally listed as "threatened" on March 19, 1998.
Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.
Lower Columbia River Steelhead *(Oncorhynchus mykiss*), were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.

Describe the status of the listed natural population (s) relative to "critical" and "viable" population thresholds.
Recovery targets have been established for populations in the Lower Columbia ESU by the Lower Columbia Fish Recovery Board in 2004.

Identify the ESA-listed population(s) that may be incidentally affected by the program

Middle Columbia River Steelhead March 19, 1998; 64 FR 14508, Threatened. Within the Middle Columbia River Steelhead ESU, hatchery STHD stocks from outside the ESU are imported and released into the White Salmon (Skamania Hatchery winter and summer steelhead), Klickitat (Skamania Hatchery winter and summer steelhead) and Walla Walla (Lyons ferry), The BRT concluded that the Middle Columbia steelhead ESU is not presently in danger of extinction, but reached no conclusion regarding its likelihood of becoming endangered in the foreseeable future. All BRT members felt special concern for the status of this ESU and concluded that NMFS should carefully evaluate conservation measures affecting this ESU and continue monitoring its status.

The current status of summer and winter run steelhead in the Klickitat River is not known. These runs are believed to be native to the system. Lack of funding and the inherent difficulty conducting population surveys in this river contribute to the current lack of knowledge. The Yakama Nation (YN) has conducted population surveys in the Klickitat River to gather information on steelhead; they have conducted spawning ground surveys in a limited number of tributaries in the basin and operated several downstream smolt traps. The YN estimated an annual escapement of 260 steelhead per year based on spawning ground survey data collected from 1996 to 2000 (NMFS 2000a). These spawning ground surveys cover less than 50 percent of the available spawning habitat for steelhead in the Klickitat River basin (B. Sharp, YN, pers. comm.). Results from the smolt traps are insufficient to make any productivity conclusions. (The trap placements in the river were not effective at catching fish). The YN is currently relocating the smolt traps to more efficient trapping locations (MCRM FMEP 2003). NMFS has developed an interim abundance target of 3,600 steelhead including winter and summer stocks for the Klickitat River system (NMFS 2002a).

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Status: Washington's Columbia River chinook salmon have been split into two split Major Ancestral Lineage (MAL): 1) Upper Columbia and Snake spring chinook and 2) Upper Columbia summer chinook and Columbia River fall chinook (Marshall et al 1994). Native fall chinook from the White Salmon River are part of the Mid-Columbia "tule" fall chinook Genetic Diversity Unit GDU, and the native spring chinook salmon are part of the Lower and Mid-Columbia (GDU). The recently established fall chinook "bright" population in the lower White Salmon is part of the Upper Columbia fall GDU, and the Carson stock hatchery spring chinook salmon released into this subbasin are part of Upper Columbia River GDU. Although native, the current stock origin (origin of natural spawners) for the natural spawning tule fall chinook is considered mixed (WDF and WDW 1993). Hatchery tule fall chinook were last released into the White Salmon River in the 1980s, but strays are still commonly recovered in the river. Most are probably from the Spring Creek NFH. The WDFW has monitored the White Salmon River tule fall chinook stock since 1964, and has noted a long-term decline in abundance. Current habitat availability and conditions in the White Salmon River watershed is insufficient to support a self-sustaining tule fall chinook population. When built in 1912 the Condit Dam reduced available habitats to anadromous salmonids by more than 90 percent. The dam continues to degrade spawning and rearing habitats by preventing the recruitment of spawning gravel into the river downstream of the dam, and allowing the accumulation of fine sediments in the lower river reaches, choking spawning beds. Along with habitat degradation, native stocks of White Salmon River fall chinook and summer and winter steelhead are impacted by the introduction of hatchery fish. Stock origin of White Salmon tule fall chinook is mixed (WDFW MCMA FMEP).

Table 1. Fall chinook salmon abundance estimates in the LCMA.

Year	Coweeman River	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River
1990	241	2,698	123	Na	20,54	342	17,506	2,062
1991	174	2,567	123	33	5,085	230	9,066	3,494
1992	424	2,489	150	Na	3,593	202	6,307	2,164
1993	327	2,218	281	3	1,941	156	7,025	3,836
1994	525	2,512	516	0	2,020	395	9,939	3,625
1995	774	2,231	375	30	3,044	200	9,718	2,969
1996	2,148	1,602	667	351	10,630	167	14,166	2,821
1997	1,328	2,710	560	Na	3,539	307	8,670	4,529
1998	144	2,108	1,287	66	4,318	104	5,929	2,971
1999	93	997	678	42	2,617	217	3,184	3,105
2000	126	2,700	852	27	1,420	323	9,820	2,088
2001	646	5,013	4,951	132	3,714	530	15,000	3,901
2002	Na	14,427	7,477	140	18,952	1,375	17,106	6,050
2003	Na	10,329	13,846	450	24,782	727	20,171	3,044

Na –Data not available

Lower Columbia River Steelhead *(Oncorhynchus mykiss*), were listed as threatened under the ESA on March 19, 1998. The White Salmon steelhead are considered to be part of the Middle Columbia GDU, which includes Washington steelhead populations between the White Salmon and Walla Walla Rivers (Leider et al. 1995) and NMFS has included this population in the Middle Columbia River Evolutionary Significant Unit (ESU).

Status

Both summer and winter steelhead are found in the White Salmon River (WDF and WDW 1993). The Condit Dam blocks upstream migration at RM 3.3, eliminating more than 90 percent of the previously accessible steelhead habitat. A sub-basin plan study suggests that available habitat in the lower 3.3 miles of the river (below the dam) will support a population of only 50 wild summer and 50 wild winter adult steelhead (WDW et al. 1990b). Summer and winter hatchery steelhead are released into the White Salmon River as part of the U.S. vs. Oregon agreement. The winter Skamania hatchery stock originated from wild fish from the Washougal River and the Beaver Creek hatchery located on the Elochoman River. Skamania hatchery summer and winter steelhead are not considered part of the Middle Columbia River Steelhead ESU (64 FR 14517). Steelhead are native to the White Salmon River (WDF et al. 1993) and their historical distribution extended from the mouth up to RM 16 in the mainstem, and Buck, Spring, Indian, and Rattlesnake Creeks. The current distribution is limited to the area below Condit Dam (RM 3.4). The status of steelhead in the White Salmon River is listed as depressed due to the lack of access to historical spawning areas (WDF et al. 1993). Since population monitoring for the White Salmon River does not occur, the status may be inferred from estimates of wild Middle Columbia River summer steelhead abundance, wild A-run abundance, and the EDT model. Summer steelhead above Bonneville Dam are considered B-run steelhead if they originate from portions of the Clearwater and Salmon rivers in Idaho, and are considered A-run if they originate from other areas. (TAC 1996). B-run fish tend to be later timed and larger then A-run steelhead. Wild steelhead abundance is estimated by the US v Oregon Technical Advisory Committee (TAC) annually. A-run abundance declined from the mid 1980s to a low in the mid-1990s, and has recently rebounded. Middle Columbia steelhead appear to follow the same pattern and comprise about 25% of the A run abundance between 1997 and 2001. The portion of White Salmon summer steelhead in these counts is unknown but believed to be very small. Since steelhead and salmon in the White Salmon River basin are listed for protection under the ESA, tributary

fisheries must be approved by NOAA-Fisheries. Although not monitored directly, the mortality of catch and release fisheries for steelhead in the White Salmon River is estimated from hooking mortality studies and fishing effort in other basins within southwest Washington (Rawding 1998). Estimates of wild steelhead harvest in the White Salmon are similar to those in the Kalama Subbasin. It is assumed sport fishery wild steelhead harvest rates in the White Salmon River are similar to the Kalama River. Wild summer steelhead impact were substantially reduced in 1986 after wild steelhead release regulation were enacted. Current impacts from tributary sport fisheries are estimated to be 4% for summer steelhead and 4% for winter steelhead (WDFW MCMP FMEP 2003).

Table 2. Wild winter steelhead abundance estimates in the LCMA.

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		Index Trap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	Na
1991	Na	904	108	72	114	108	1,128	Na
1992	Na	1,290	44	88	142	322	2,322	Na
1993	438	1,242	84	90	118	165	992	Na
1994	362	632	128	78	158	90	853	Na
1995	252	396	174	53	206	175	1,212	Na
1996	44	150	Na	Na	Na	251	853	70
1997	108	388	Na	192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	Na
2001	284	334	192	79	216	185	1085	Na
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

Na –Data not available

Columbia Basin DPS Bull Trout *(Salvelinus confluentus*)

The status of bull trout in the White Salmon River is unknown. Bull trout have been observed in the mainstem below Condit Dam and managers believe these fish are part of an adfluvial population, which uses the Bonneville Reservoir. In 1993, bull trout presence/ absence surveys were conducted in the watershed as a cooperative project between the U.S. Forest Service (USFS) and WDFW. No bull trout were found in any stream during this limited sampling effort. The WDFW has initiated a bull trout-sampling project in the Columbia Gorge Province to more accurately determine the distribution of bull trout in the White Salmon River and other Washington tributaries. In the White Salmon River, surveys will focus on cold-water habitats that can support bull trout. Until this project is completed, there is insufficient information to determine distribution, assess population status, or develop a recovery plan for these fish.

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999).

Broodstock Program:

Broodstock Collection: Not applicable to this HGMP. See Skamania summer steelhead HGMP. Indirect take from this operation is unknown.

Genetic introgression: Summer steelhead are native to the White Salmon River although access to 70% of historic habitat of this stock has been lost due to the construction of Condit Dam. This is a stock of unknown origin with wild production. However, it is not known whether native steelhead have hybridized with hatchery steelhead that were planted or strayed into the river (SaSI 2002, Draft). Planted fish are Skamania Stock, which originated from the Washougal and Klickitat Rivers. The reproductive success of Skamania and Chambers Creek hatchery stocks in the Kalama River was only 16% and 12% of wild steelhead in this basin due to advanced spawn time and domestication (Chilcote et al. 1986, Leider et al 1990, and Hulett et al 1998). WDFW uses differential spawning times to reduce risks to wild steelhead populations from hatchery programs. Genetic analysis from allozymes collected from *O. mykiss* parr below Condit Dam, which were presumably from steelhead, indicated this stock grouped most closely with inland steelhead from the upper Columbia River and not with the hatchery steelhead or rainbow stocks planted in the basin (Phelps et al. 1994).

Rearing Program:

Operation of Hatchery Facilities: From 1988 until 2001, a net pen operation existed and reared the program in Northwestern Lake behind Condit Dam, a cooperative project of Pacific Power and Light, Washington Department of Wildlife, and the White Salmon Steelheaders. Potential future Condit Dam removal plans have stopped this operation. Steelhead are now planted directly, without prior acclimation.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of programs. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Although pathogens may cause post release mortality in fish from hatcheries but there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; foot et al. 2000; Stewart and Bjornn 1990). Indirect take from disease effects is unknown.

Release:

Hatchery Production/Density-Dependent Effects: The current program release of 20,000 is a minimal level for plants used to generate harvest. Density effects would be an issue if steelhead do not migrate from the system and compete or interact with listed fish. As adults, with selective fishery regulations, few hatchery steelhead are expected to escape throughout the system to spawn and spawning success is predicted to be low. Indirect take from production or density dependent effects are unknown.

Competition: WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. The SIWG (1984) concluded that "migrant fish will likely be present for too short a period to compete with resident salmonids." Fish released on station in large river systems travel rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998). In a study designed to define the migrational characteristics of chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1986), found the average migration rates for subyearling chinook, yearling chinook, coho salmon and steelhead, were 22, 18, 17, and 35 RKm daily, respectively.

Predation: Hawkins and Tipping (1999) reported that in 1998, nearly half of the hatchery steelhead smolts sampled on the Lewis River, Washington contained chinook salmon fry and the smolts had consumed a mean of 1.13 fry each. However, Martin et al. (1993), Cannamela (1993) and Jonasson et al. (1995) found low rates of predation on upper Columbia River tributaries, with 0.0% to 0.18% of hatchery steelhead smolts containing juvenile chinook salmon. The variable

predation rates cited above were associated with extremes in chinook salmon fry abundance; low chinook spawner densities were reflected in low predation rates and high chinook spawner densities reflected high predation rates. Recent research in Puget Sound has correlated low hatchery steelhead predation in systems with low to moderate levels of juvenile chinook abundance (Response of Chinook Salmon Egg-to-Migrant Survival to Various Hatchery Steelhead Smolt Release Levels in the Skagit River, Washington, Curtis R. Kraemer*, Jack M. Tipping 11/3/04 Draft).

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG 1984 for a review) with risk greatest in small systems during periods of low flow and high clarity. The majority of flow in the Big White Salmon river is from glacial melt runoff and/or from springs and seeps from the porous basalts that are present through much of the watershed. Peak flows in the mainstem are generated by snowmelt runoff and occur in the spring, increasing from an average daily flow of 644 cubic feet per second (cfs) in the fall to flows of 1,538 cfs during this time frame.

Dates of Release: Steelhead smolts can be released from mid-April to May. In 2004, steelhead plants to the White Salmon River occurred on May 4 to protect LCR chum and at the same time allow for additional growth of chinook. Release by early May is believed to avoid the peak wild steelhead fry swim-up windows (Table 2)

Relative Body Size: Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). Although predation on larger chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" is valid until further species data for these systems can be collected.

Release Location and Release Type: The direct out-plant from Skamania Hatchery is made at RM 1.5. Previous releases were acclimated to the White Salmon River system in the Northwestern Lake Net Pens and trucked below Condit Dam.

We have provided in this section a summary of empirical information and theoretical analysis of competition and predation interactions that may be relevant to the S.F.Toutle steelhead program.

Potential Big White Salmon River summer steelhead predation and competition effects on listed salmonids:

The proposed annual production goal for this program is up to 20,000 fish at an average size of 5.0 fpp (approximately 210 mm fl). Fish are directly out-planted from mid-April to May 1st. Steelhead released as actively migrating smolts would not likely compete for food or habitat with fingerling stocks of chinook or steelhead. At 5.0 fpp steelhead pose an unknown predation risk on listed fish of 70 mm fl and smaller. The magnitude of predation will depend upon the characteristic of the listed population of salmonids and the habitat in which the population occurs.

Wild steelhead including emerging fry and migrating yearlings occur in both the Mid and

Lower Columbia ESU. Depending on available temperature units, eggs in the Lower Columbia ESU will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching (Table 2). Based on the migration and dispersal of the hatchery program, it is likely that a significant portion of this occurs before peak emergence of listed winter steelhead.

Table 2. Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27- July 7	June 17	LCSI Draft 1998
Summer	February – April	March 20- 30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama Research Report

Residualism: To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, active pond management, fish size, and condition guidelines (Steelhead Guidelines, July 2001). Factors including a 0.90-0.99 Condition Factor (K factor) and co-efficient of variation on lengths of fish (fl) (CVs) of less than 10% are part of the steelhead rearing guidelines. Recent research (Rhine et al. 1997, Bigelow 1997) indicates steelhead smaller than 180 mm are more prone to residualize, while smolting and survival are optimized on fish greater than 190 mm fl (WDFW Steelhead rearing guidelines July 31, 2001).

As a case in point, data from steelhead release programs on the Toutle River system are representative of the Lower Columbia steelhead programs at release. These data illustrate that few fish are <180 mm fl and greater than > 250 mm fl on release. Below are presented length frequency samples of 100 smolts from 20,000 summer steelhead released directly from the N.F.Toutle Hatchery and 20,000 summer steelhead released from the Cowlitz Game and Anglers Acclimation Pond located on the S.F. Toutle River. In both cases, few fish are outside these general guidelines for optimum steelhead size at release. Indirect take from residualism is unknown.

Figure 1. N.F. Toutle Summer Steelhead Plants (Hatchery Site Plants)

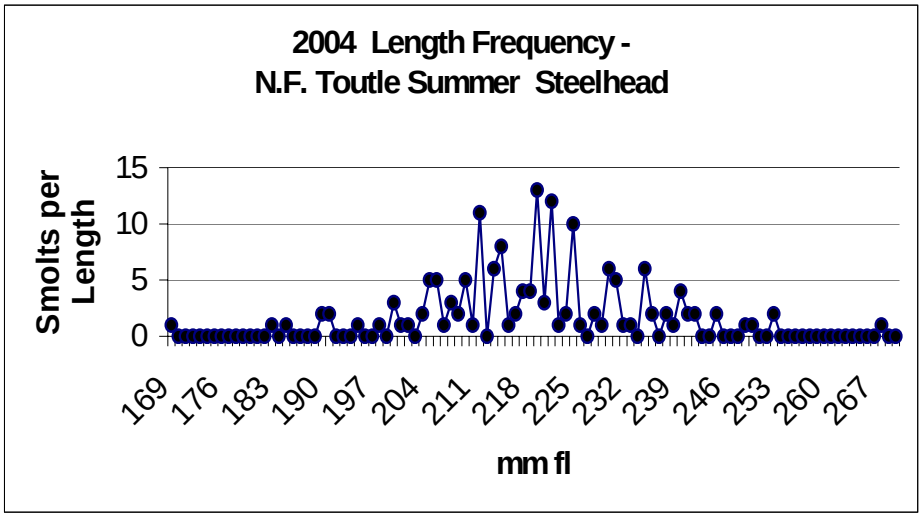
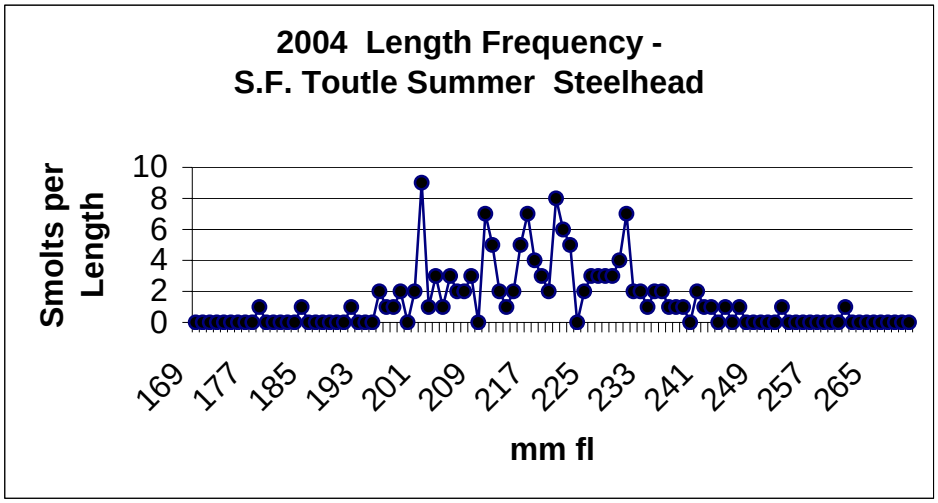


Figure 2. S.F. Toutle Summer Steelhead Plants (Acclimation Pond Program)



Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally and spatially in the migration corridor. Once in the main stem, Witty et al. (1995) concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in that environment. Indirect take in the migration corridor or ocean is unknown.

Associated monitoring and evaluation and research programs: The following monitoring baseline activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, EF Lewis, rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations. Snorkel surveys are conducted for summer steelhead in the EF Lewis, Washougal rivers. Trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton Creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis, and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all activities follow scientific protocols designed to minimize impact.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition were highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is

not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. There will be no direct take tables included for this program.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Take levels are unknown, but if wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist along with the Complex Manager would determine an appropriate plan.

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

For ESU-wide hatchery plans, the plant of summer steelhead into the Big White Salmon River is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. vs. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations for the production of winter steelhead for the Big White Salmon River:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations.

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

WDFW Steelhead Rearing Guidelines. Details rearing guidelines and rearing parameters statewide (July 31, 2001).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- Lower Columbia Steelhead Conservation Initiative (LCSCI)
- The Columbia River Fish Management Plan
- U.S. v Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 /Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy

Constraints on this facility relative to the IHOT Operation Plan are described in the Hatchery Evaluation Report Skamania Hatchery- Winter Steelhead 1997. The Clark Public Utility and the Department of Fish and Wildlife have a partnership (MOA) at the Vancouver Hatchery, which provides rearing and incubation for the Skamania winter steelhead program. The Vancouver Hatchery has pathogen free water, which provides IHN virus protection for Skamania Summer Steelhead during spring rearing activities.

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Harvest objectives established by subbasin planners for sport and tribal fisheries in the White Salmon River were 500 spring chinook, 100 fall chinook, 100 coho, 4,800 summer steelhead, and 800 winter steelhead. However, it is important to note that these objectives were not based on the potential for anadromous fish production in the upper watershed. In addition, most of the summer steelhead harvested in and at the mouth of the White Salmon River are not produced in the basin. Steelhead migrating to upriver tributaries of the Columbia River typically “dip in” to the cooler waters of the White Salmon. Hatchery steelhead smolts, including both summer and winter runs from Skamania or Vancouver hatcheries, are released on an annual basis in the Big White Salmon River to provide for sport fisheries.

Mainstem Columbia River sport and commercial impacts are not estimated directly for White Salmon River steelhead but are estimated for the Middle Columbia River ESU, which includes the White Salmon steelhead population. Middle Columbia River impacts are less than 2% and these impacts occur mainly in the spring chinook tangle net fishery and the summer steelhead sport fishery. WDFW receives authorization for these fisheries through a Section 7 consultation/Section 10 Permits and biological opinion from NOAA-Fisheries. Tribal fisheries impact both summer and winter steelhead. These fisheries are authorized through a Section 7 consultation/Section 10 Permit and biological opinion from NOAA-Fisheries. Tribal fisheries target salmon stocks and steelhead are incidentally taken when salmon fishing. Winter steelhead are caught primarily in the winter steelhead and the spring chinook fishery. Summer steelhead are caught primarily in the fall fishery, with fewer fish caught in other fisheries. Both winter and summer stocks are intercepted in ceremonial and subsistence fisheries. In 2003, the projected impacts to wild Middle Columbia River steelhead from tribal fisheries were 4% and the maximum impact was 9%. The annual cumulative impact from all fisheries are likely to range

from 11% to a maximum of 16% of run size .

The WDFW will manage fisheries in the Klickitat and White Salmon river basins at an impact rate of 10 percent or less on wild steelhead populations. Without run size data, impacts can be estimated using fishery and run timing, estimates of encounters of wild fish, and hooking mortality.

Table 3. Annual Sport Catch

Return Year	Sport Harvest Hatchery	Smolt Releases
1993/94	1,335	31,200
1994/95	2,121	0
1995/96	2,652	0
1996/97	2,454	29,900
1997/98	1,747	0
1998/99	1,055	13,800
1999/00	1,102	30,600
2000/01	2,075	0
2001/02	8,363	0
2002/03	2,971	0
2003/04	Na	0

3.4 Relationship to habitat protection and recovery strategies.

Subbasin Planning and Salmon Recovery:
The current Skamania HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. Regional sub-basin planning process (Draft Washougal River Subbasin Summary May 17, 2002, and White Salmon River Subbasin Plan May 24, 2004 are broad-scale initiatives that will provide building blocks of recovery plans use by recovery planners on listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the recovery plans including the role of fish release programs originating from Skamania Hatchery and outplants to Region 5 streams.

Habitat Treatment and Protection:
WDFW along with other local government agencies is presently conducting or has conducted habitat inventories within the White Salmon subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis:
A WRIA 29 (Wind-White Salmon River) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission with the input of WDFW Region 5 staff. Hydroelectric development in the White Salmon river, construction of Bonneville Dam with its associated pool, logging in the Gifford Pinchot National Forest, poorly designed and installed culverts, especially along state highway 14, and other factors have had a serious detrimental effect on the aquatic resources in WRIA 29. The Wind River remains as a viable

anadromous fish producer even though its habitat has been severely impacted.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Big White Salmon summer steelhead program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Big White Salmon River steelhead smolts can be preyed upon release through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. While not always desired from a production standpoint, these hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed reducing residency. The nutrient enhancement from spawned salmonid and non-salmonid species may contribute nutrients that increase overall productivity in the watershed, reducing inter-species interactions.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Big White Salmon River steelhead smolts can be preyed upon release through the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts (river otters), and returning adults include: harbor seals, sea lions and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

See Skamania Hatchery Summer Steelhead HGMP

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge. See Skamania Hatchery Winter Steelhead HGMP only.

See Skamania Hatchery Summer Steelhead HGMP

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

See Skamania Hatchery Summer Steelhead HGMP

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

The Skamania Hatchery has two fish transport trucks. One 1979 Chevrolet 1,500 gallon tanker truck and one 1991 International 2,000 gallon tanker truck. The International has the capacity for hauling and off-loading brood fish. We have plans to develop an overhead crane loading system using a water-to-water container for loading fish for re-cycle to the fishery downstream.

5.3 Broodstock holding and spawning facilities.

See Skamania Hatchery Summer Steelhead HGMP

5.4 Incubation facilities.

See Skamania Hatchery Summer Steelhead HGMP

5.5 Rearing facilities.

See Skamania Hatchery Summer Steelhead HGMP

5.6 Acclimation/release facilities.

This is a direct plant. Not applicable to this HGMP.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

See Skamania Hatchery Summer Steelhead HGMP

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

See Skamania Hatchery Summer Steelhead HGMP

Section 6. Broodstock Origin and Identity

6.1 Source.

See Skamania Hatchery Summer Steelhead HGMP

6.2.1 History.

See Skamania Hatchery Summer Steelhead HGMP

6.2.2 Annual size.

See Skamania Hatchery Summer Steelhead HGMP

6.2.3 Past and proposed level of natural fish in the broodstock.

Natural fish are not integrated within the broodstock.

6.2.4 Genetic or ecological differences.

See Skamania Hatchery Summer Steelhead HGMP

6.2.5 Reasons for choosing.

See Skamania Hatchery Summer Steelhead HGMP

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

See Skamania Hatchery Summer Steelhead HGMP. Natural fish are not used in broodstock selection and can be identified by adipose fin presence and are released in stream reaches as prescribed by WDFW Region 5 biologists.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults).

See Skamania Hatchery Summer Steelhead HGMP

7.2 Collection or sampling design.

See Skamania Hatchery Summer Steelhead HGMP

7.3 Identity.

See Skamania Hatchery Summer Steelhead HGMP

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):
See Skamania Hatchery Summer Steelhead HGMP

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

See Skamania Hatchery Summer Steelhead HGMP

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

See Skamania Hatchery Summer Steelhead HGMP

7.6 Fish transportation and holding methods.

See Skamania Hatchery Summer Steelhead HGMP

7.7 Describe fish health maintenance and sanitation procedures applied.

See Skamania Hatchery Summer Steelhead HGMP

7.8 Disposition of carcasses.

See Skamania Hatchery Summer Steelhead HGMP

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

See Skamania Hatchery Summer Steelhead HGMP

Section 8. Mating

8.1 Selection method.

See Skamania Hatchery Summer Steelhead HGMP

8.2 Males.

See Skamania Hatchery Summer Steelhead HGMP

8.3 Fertilization.

See Skamania Hatchery Summer Steelhead HGMP

8.4 Cryopreserved gametes.

Not Applicable.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

See Skamania Hatchery Summer Steelhead HGMP. No listed natural fish are used in the mating scheme.

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

See Skamania Hatchery Summer Steelhead HGMP

9.1.2 Cause for, and disposition of surplus egg takes.

See Skamania Hatchery Summer Steelhead HGMP

9.1.3 Loading densities applied during incubation.

See Skamania Hatchery Summer Steelhead HGMP

9.1.4 Incubation conditions.

See Skamania Hatchery Summer Steelhead HGMP

9.1.5 Ponding.

See Skamania Hatchery Summer Steelhead HGMP

9.1.6 Fish health maintenance and monitoring.

See Skamania Hatchery Summer Steelhead HGMP

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation. See

See Skamania Hatchery Summer Steelhead HGMP

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available. See Skamania Hatchery Winter Steelhead HGMP.

See Skamania Hatchery Summer Steelhead HGMP

9.2.2 Density and loading criteria (goals and actual levels).

See Skamania Hatchery Summer Steelhead HGMP

9.2.3 Fish rearing conditions.

See Skamania Hatchery Summer Steelhead HGMP

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

See Skamania Hatchery Summer Steelhead HGMP

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

See Skamania Hatchery Summer Steelhead HGMP

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

See Skamania Hatchery Summer Steelhead HGMP

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

See Skamania Hatchery Summer Steelhead HGMP

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

See Skamania Hatchery Summer Steelhead HGMP

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

See Skamania Hatchery Summer Steelhead HGMP

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- Listed fish are not under propagation.
- Steelhead are marked for broodstock identification.
- Holding pond procedures follow IHOT guidelines.
- Non-target listed fish will be released immediately, if encountered, during the brood stock collection process.

Section 10. Release

10.1 Proposed fish release levels.

20,000 yearlings 5.0-5.5 fpp.

10.2 Specific location(s) of proposed release(s).

In the past, fish were acclimated at the Norwestern Lake Co-op Net Pens and shipped downstream below Condit Dam. The net pen operation was suspended due to operational concerns and potential removal of Condit Dam. Beginning in 2002, fish are direct planted to the boat launch site located at RKm 1.5.

10.3 Actual numbers and sizes of fish released by age class through the program.

Release Year	Yearling Release		
	No.	Date (MM/DD)	Avg Size (fpp)
1995	29,900	Not Available	Not Available
1996	0	April 15-May 10	5.7
1997	13,800	April 15-May 10	6.0
1998	30,600	April 15-May 10	5.6
1999	0	-	-
2000	0	-	-
2001	0	-	-
2002	0	-	-
2003	0	-	-
2004	22,764	May 4	5.3

10.4 Actual dates of release and description of release protocols.

Releases can occur from a window from mid-April to May. Operations have been trying to hold fish until May to reduce impact on listed LCR chum and allow fingerling chinook stocks additional time to grow in order to reduce predation impact. Previous releases were trucked from the Northwestern Lake Net Pens below Condit Dam at RM 1.5. With the net pen operation discontinued, direct outplants was made from Skamania Hatchery to the White Salmon River below Condit Dam.

10.5 Fish transportation procedures, if applicable.

A 1,900 gallon capacity tanker truck is used for off-station release or transfer to acclimation ponds. Fish are in transit for 1.0 to 1.5 hours depending on the location of release. Loading densities are kept between 0.5 and 1.0 pounds per gallon. Salt is added to the tanker at a rate of 0.5% of the volume by weight. Temperature is monitored in the tank and tempering is performed at the release / transfer site if the difference between the tank and the release water is greater than 7 degrees F. Supplemental oxygen is administered at 2.5 liters per minute.

10.6 Acclimation procedures (*methods applied and length of time*).

This is a direct plant into the Big White Salmon River.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Winter steelhead are mass marked (adipose fin-clipped) so that they can be distinguished from the natural population.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

If surplus exceeds 10% of the permitted release number, Complex Manager would contact WDFW Regional Manager. Regional Manager would in turn contact the appropriate policy persons for determination in disposition of excess production. Resident lakes could be used where a clear expectation of sport harvest can occur.

10.9 Fish health certification procedures applied pre-release.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Prior to this examine, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy and IHOT guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

See Skamania Hatchery Summer Steelhead HGMP.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced chinook, steelhead and chum juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible. Smolt releases are in below known wild fish spawning and rearing habitat in the Big White Salmon.
- Returning hatchery fish are under heavy selective harvest and are identified by adipose fin-clip.
- Hatchery stock and wild fish are isolated by timing.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to assess, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Washougal Hatchery programs are communicated to Region 5 staff for risk management or needed treatment. See also section 9.7.
- Big White Salmon winter steelhead plant levels since 2001 (avg. 22,466) have been significantly reduced from levels (avg. 37,000) prior to 2000. This is a reduction of almost 39% (WDFW Historical Database).

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). See section 1.10 Monitoring an Evaluation for additional plans and methods to collect data necessary.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Current Region 5 Fish program staff are available to continue baseline monitoring and evaluation in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon evaluation including: redd surveys, mark-recapture surveys, trap counts, snorkel surveys Area-Under-the-Curve (AUC) surveys, sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation and downstream migrant trapping in many rivers. Longstanding steelhead research is on-going in the Kalama River system for interactions of hatchery and wild steelhead .

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality then traps will be removed or opened up to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

Ongoing research on the Kalama River will be used to evaluate steelhead programs Region wide. The objectives of this work are to: 1) design and implement a wild broodstock hatchery program, 2) assess the reproductive success of hatchery fish from wild broodstock relative to that of wild fish, 3) measure interbreeding between wild fish and hatchery fish from wild broodstock and its effect on productivity of the naturally spawning population, and 4) assess the efficacy of wild broodstock hatchery programs in achieving natural production and other fishery management objectives including containment of risks to wild stocks. A thorough treatment of goals and objectives of the program as well as justification for and benefits of the work in the Kalama Basin is provided in Sharpe et al. (2000).

12.2 Cooperating and funding agencies.

See Kalama River wild summer and winter steelhead HGMPs.

12.3 Principle investigator or project supervisor and staff.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

12.6 Dates or time periods in which research activity occurs.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1). NA

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

“I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____